

and by Rehder (Man.), but without dragging in the very different *A. stolonifera*. In *A. canadensis*, which had long been cultivated in European gardens and which, like *A. spicata*, “on cultive au Jardin du Roi”, the leaves are broadly rounded at summit, the young hypanthium densely pilose and the sepals soon erect or strongly ascending.

The insistence that *Amelanchier spicata* originated in America is based on rather unsatisfactory evidence. Lamarck did not assert that it came from Canada, but that “They pretend or claim that it is found in Canada” (“On prétend que cet arbrisseau se trouve au Canada”). That was a qualified statement, not a clear statement that it is Canadian. It seems more probable that it originated in the Jardin du Roi, possibly as a cross of *A. canadensis* and *A. ovalis*. It is time to exclude without quibble the name *A. spicata* (Lam.) K. Koch from North American treatments of *Amelanchier*.

EXPLANATION OF PLATES 1027–1030

PLATE 1027, AMELANCHIER SPICATA (Lam.) K. Koch, both figs. enlarged to $\times 1$, from photograph of TYPE of the basic *Crataegus spicata* Lam. (from negative taken by Professor Alfred Rehder and preserved in the Herbarium of the Arnold Arboretum): FIGS. showing vegetative leafy shoot with subapproximate lateral nerves, the blades broadly rounded to subtruncate, the calyx-teeth and petals strongly ascending.

PLATE 1028, AMELANCHIER OVALIS Medic.: FIG. 1, flowering and fruiting branches, $\times 1$, from Alsace, Spach (note broadly rounded to subtruncate leaves with subapproximate ribs; also erect calyx-lobes and petals); FIG. 2, portion of flowering raceme, $\times 5$, showing densely pilose pedicel and calyx; also erect calyx-teeth and petals.

PLATE 1029, AMELANCHIER STOLONIFERA Wiegand, all figs. from TYPE: FIG. 1, flowering stem, $\times 1$, showing long smoothish pedicels and spreading calyx-teeth and petals; FIG. 2, summit of raceme just past anthesis, $\times 5$, showing glabrous pedicels and calyx and spreading calyx-teeth; FIGS. 3 and 4, lower and upper faces of mature (autumnal) leaves, showing remote ribs, $\times 1$.

PLATE 1030, AMELANCHIER STOLONIFERA Wiegand, both figs. from TYPE: FIG. 1, stem with half-mature fruit, showing short-acuminate leaves, long glabrous pedicels and spreading calyx-teeth; FIG. 2, leaves of vegetative sprout, showing distant ribs.

A MONOGRAPH OF AMELANCHIER.—Perhaps no genus of the *Rosaceae* in North America, except of course *Rubus* and *Crataegus*, has offered so much of perplexity and has had such contradictory treatment as *Amelanchier*. Wiegand brought much light into the problem and established by his detailed studies, published from 1912 to 1921, the more important characters of growth-habit, flowers, fruit and foliage of the several eastern North American species. Wiegand, however, too much accepted traditional misidentifications and apparently did not always trace the older names to their actual types; his strength lay in his tireless field-observa-

tions and clarification of morphological characters. Most of the types have subsequently been checked and the names of several species, of which the morphological characters were accurately and painstakingly worked out by Wiegand, have, consequently, been readjusted. Now comes a beautifully printed and well illustrated monograph of 100 pages and 23 plates by Professor George Neville Jones¹. Professor Jones dismisses at once the decision of Wiegand and very many others with extensive field-experience that hybridization occurs to any extent in *Amelanchier*, although he does actually admit the single hybrid, $\times A. grandiflora$ Rehder and in a note concedes a cross of *A. Bartramiana* and *A. canadensis*. His conclusion is based on cytological studies by others in the subfamily *Pomoideae*, Sax having reported, as quoted by Jones, "that the pure species of *Amelanchier* that he studied are diploids, but two natural interspecific hybrids are tetraploids" and Moffett having stated that "the chromosome number of the *Pomoideae* is a 'secondary basic number (unbalanced relative to the primary basic number) and the derived series of polyploids . . . are secondary polyploids'." Jones goes on: "It seems possible, therefore, that polyploidy may have played a more important part in the differentiation of genera and species in this subfamily than has heretofore been realized, since a change in chromosome balance is usually accompanied by a change in the morphological characters of the plant". Isn't it common knowledge that the vast number of strikingly different and fully appreciated apples and pears (such strikingly dissimilar apples as Baldwin, Gilliflower, Lady and Red Siberian, or such contrasted pears as Bartlett, Seckel and Beurre Bosc) are the result of hybridization? Ability to hybridize is the basis of pomology. If the *Pomoideae* did not freely lend themselves to crossing, apples and pears would be pretty poor food. Groups in which hybridization (therefore allopolyploidy) is rare or difficult to achieve are not horticultural successes! Professor Jones dismisses generally recognized hybridization in the *Pomoideae* because "polyploidy may have played a more important part"; but he does not seem to recognize the elementary fact that allopolyploidy is an accompaniment of hybridization! Witness the distinction between the two types of polyploidy as clearly indicated in Julian Huxley's "Evolution: the Modern Synthesis" (p. 334):

Next we have the various phenomena of polyploidy in which a multiplication of whole genomes or chromosome-sets occur. As already mentioned, polyploidy is of two fundamentally distinct types: autopolyploidy in which the chromosome sets are all of the same kind, derived from the same species, and initial allopolyploidy, in which they are of different kind, derived from two distinct species. The actual doubling is in both cases due to the suppression of division of a cell after division of the chromosomes has taken place, but whereas this is the primary event in autopolyploidy, in allopolyploidy it is subsequent to hybridization.

The generally recognized hybrid of *A. Bartramiana* and *A. laevis*, which Dr. Jones evidently, from the citation of specimens, has known only as dried material collected by others, is treated as a full species, *A. neglecta* Eggleston, although the specimens loaned to Dr. Jones for study often have his validation as " $\times A. neglecta$ "! Most other hybrids, of which

¹ GEORGE NEVILLE JONES. American Species of *Amelanchier*. Illinois Biological Monographs, xx. no. 2. 100 pp. 23 plates. Univ. Ill. Press, Urbana, Ill. 1946. \$1.50, paper-cover; \$2.00, cloth-cover.

Wiegand had very many, are placed without reservation in single recognized species because, by the author's unique reasoning, they are polyploids.

A total of 18 species is admitted for the whole continent, an ultra-conservative number which many, who have had more extended field-acquaintance with the shrubby members, will doubtless be inclined to augment. Pubescence (usually a pretty variable and too often a passing character) is largely relied upon, the first division of the eastern species depending on "Top of ovary glabrous" as opposed to "Top of ovary tomentose, usually densely so, rarely with only a few trichomes", while under the latter the eastern species are again divided on more or less persistence of pubescence. This may be the best that can be done, but it is unfortunate that so fluctuating a character as persistence of pubescence has to be made fundamental. The characters of hypanthia, sepals, petals, styles, etc., used to separate species, seem more stable; and growth-habit, which is well understood by those who, like Wiegand, spent many seasons in studying the genus in the field over an extensive area, is really important.

Dr. Jones reproduces, most happily, photographs, so far as they were accessible to him, of types or isotypes, a large proportion of the originals borrowed from the Gray Herbarium. In two cases only tracings made by others and borrowed by him are given, as in plate XI, fig. 1, a tracing made by the late Benjamin L. Robinson and bearing in his hand the explanation, or in plate XVII, fig. 2, another tracing made by Dr. Robinson (with his characteristic handwriting nearly covering the sheet). These illustrations are invaluable.

In some cases, at least, the photographs of the types lead one to wonder at the identifications. For instance, plate XI, fig. 2, shows a small and not very clear photograph of *Crataegus spicata* Lam., basonym of *A. spicata* (Lam.) K. Koch, which Dr. Jones feels to be "clearly . . . the common and widespread small serviceberry of eastern North America": *A. humilis* Wiegand, *A. stolonifera* Wiegand and the more localized and southern *A. austromontana* Ashe. Whether those who have for many years known the stoloniferous and loosely colonial low *A. stolonifera* and *A. humilis* will be satisfied that the calcicolous inland *A. humilis* and the oxylophytic *A. stolonifera*, chiefly of the Atlantic slope, are identical is very doubtful; and it is extremely doubtful if anyone but Dr. Jones will be satisfied that either of these dwarf and colonial American shrubs is identical with the non-colonial, fastigiate and very tall *Crataegus spicata* of Lamarck. The latter, a shrub of unknown nativity, supposed or claimed to have come from Canada ("On prétend que cet arbrisseau se trouve au Canada"), was cultivated in Paris in 1783. Lamarck stated that his *C. spicata* strongly resembled the widespread European species, *Mespilus Amelanchier* L., which under *Amelanchier* is known as *A. ovalis* Medicus, *A. vulgaris* Moench or *A. rotundifolia* (Lam.) Dum.-Cours., the species which had been called by Lamarck *Crataegus rotundifolia*. Lamarck said that his *C. spicata* was two or three times taller ("Cet arbrisseau [*Crataegus spicata*] a beaucoup de rapport avec le précédent [*C. rotundifolia*], mais il s'élève deux ou trois fois davantage"). Since Lamarck's *C. rotundifolia* was 3-5 feet high ("la hauteur de trois à cinq pieds"), that would make *C. spicata* measure "about 2-5 m." (as pointed out by Wiegand who is quoted by me in the illustrated study of Lamarck's type on p. 125, with plate 1027 in this number of RHODORA) in

height. The North American *A. humilis* is consistently lower, 0.3–1.5 m. high ("3–12 dm.", Wiegand, and also Rosendahl & Butters, Trees and Shrubs Minn.; "4–15 dm.", Deam, Shrubs Ind.), while *A. stolonifera* (details shown in plates 1029 and 1030 in this number) is quite as low ("3–12 dm.", Wiegand). Dr. Jones, discussing the habit of species, says (p. 10): "Certain other species, e. g., *A. spicata*, are usually dwarf, but under exceptionally favorable conditions may reach a height of two meters". That still falls far short of the maximum of 5 meters implied by Lamarck for the cultivated type of *A. spicata*; and if, as Dr. Jones believes, the southern *A. austromontana* belongs to all-inclusive *A. spicata*, it is too bad that he restricted the height to "0.3–2 m.", for *A. austromontana* was originally described by Ashe as "not exceeding 4 m. in height" (a back-handed way of implying at least more than 2 m.). The photographs of types of *A. spicata*, *A. stolonifera*, *A. humilis* and *A. austromontana* are, fortunately, all shown by Dr. Jones and outlines of characteristic leaves are displayed separately. While the leaves of the type of *A. spicata* (see plate 1027 in the article preceding this review) are quite broadly rounded to subtruncate at summit, those of all three American types are of narrower and more elongate outline and more gently rounded or tapering to the short-tipped apex and the veins of *A. spicata* are relatively more approximate. The three Americans are closely akin; the type of *A. spicata* evidently an alien, with leaves closely matched in outline, tooting and venation by very many specimens of the European *A. ovalis* Medic. (*Mespilus Amelanchier* L.) (See plate 1028 in preceding article).

If, as would seem from the photograph of the type, *Crataegus spicata* Lam. is a variation or perhaps a hybrid of the European *Amelanchier ovalis*, then it would be distinguished from our shrubs by several characters, including, according to Rehder's Manual, "Styles free" in *A. ovalis* as opposed to "Styles connate at least at base" in the remainder of the species, this character sometimes considered to have such magic that it is relied upon as the final argument in keeping apart as genera *Pyrus* ("Styles free") and *Malus* ("Styles connate at base")¹. If it be maintained that *Amelanchier spicata* is not a phase of or derivative from *A. ovalis*, it can, at least, not be satisfactorily identified with three or more lower and habitally very different American species.

Further differences from the interpretations of Wiegand and others, like the reduction outright to *A. sanguinea* (Pursh) DC. of *A. huronensis* and *A. amabilis* Wiegand, need not here be discussed. They at least show very strong departures in interpretation of characters.

Outline maps with dots indicate the ranges. These, it must be assumed, give a general picture of the range, and when such strongly contrasted areas as those of the western *A. pallida* (map 13) and of the eastern *A. Bartramiana* (map 1) are shown the contrast is striking. When, however, *A. stolonifera*, *humilis* and *austromontana* are merged (as *A. "spicata"*) one does not know how, from the map, to sort out the different elements which others recognize as true species. In some cases more attention to exact geography would have been desirable. For instance, map 2 is said to show the range of *A. neglecta*. It does in a general way, but since this shrub is not cited (or known) from the Magdalen Islands, it is at least disconcerting to see the outlines of that archipelago blackened out by a

¹ For an analysis of the reputed but sadly inconstant morphological characters separating *Malus* from *Pyrus* see RHODORA, xlv. 450 (1943).

round dot. From Nova Scotia a single collection is cited, from Meteghan, at the western end of the Province, but unsupported dots are shown all the way to northern Cape Breton, more than 500 miles northeast of the one recorded station at Meteghan. Again, the great Province of Quebec seems to have been as much of a puzzle to the map-maker as it was when, in his *Monograph of Symphoricarpos* in Journ. Arn. Arb. xxi. 216 (1940), he cited the type of *S. albus* as coming from "Quebec, Ontario, Canada". On the map of *A. neglecta* a single row of six equally spaced dots runs from the tip of the Gaspé Peninsula to the Richelieu River south of Montreal and no dot is shown north of the River St. Lawrence. Five stations are cited (instead of six): Gaspé Bay; Montmagny (more than 300 miles to the southwest); Montmorency Falls (a famous tourist-resort about 40 miles west of Montmagny and NORTH of the St. Lawrence); Lac Long (about 65 miles northwest of Montmorency and also NORTH of the St. Lawrence); and "Ottawa River" (hundreds of miles long and joining the St. Lawrence FROM THE NORTH). A mere outline of the general range might have suggested the main point; the failure carefully to consult an atlas would be less evident.

All in all the new monograph of *Amelanchier* is a very neat piece of presswork. Its illustrations of types are well reproduced and most helpful, the general ranges approximately shown (though slipping on unfamiliar territory), its descriptions detailed, the recent identifications by others of types of American species accepted (but the specific segregations and the hybrids of Wiegand not admitted) and the citations of specimens very full (though said to be incomplete). In the latter particular, with what Wiegand and many others have always considered quite separate elements here merged, it would have helped others if specimens of the different included elements could have been indicated by some sign. Where individual judgment so radically differs as in this "Monograph", especially through obviously unequal degrees of field-work and consequent understanding of the different characters and, likewise, through failure to recognize the well known fact that allopolyploids are hybrids, it would have helped, so long as the largest portion of the work is given over to very full listing of specimens, if the original identifications by Wiegand of his own species, for instance, had been noted. That would partly separate the different elements. Then the shrub which Wiegand and scores of other critical students (Butters, Deam, Fassett, Rehder, Rosendahl and many more) have considered *A. humilis* would not (when merged with the habitually similar *A. stolonifera* under the impossibly American and habitually very dissimilar *A. "spicata"*) appear to occur from Newfoundland to Georgia, where it is not found.

In the enumeration of numbered specimens (admittedly only a part of those seen) the author of the latest treatment of *Amelanchier* has the very modest score of 32, Wiegand of 85, a score which could and certainly should have been most profitably increased if Wiegand's authoritative series of 696 sheets left at Cornell University and his earlier authentic series of 63 sheets at Wellesley College—a total, with the 85 cited assumed to be duplicates, of more than 750 sheets, which largely formed the bases of Wiegand's detailed publications over ten years—had been consulted. Most surprisingly, however, there is no indication in the acknowledgments that the new author on *Amelanchier* was interested to see this great fundamental mass of authentic material. One other close field-student of the

genus over many years, one who understands the southeastern species, is credited with having participated in the collection of 183 cited numbers; another, who has closely watched the group in the field for half a century and who largely accompanied the painstaking Wiegand, with about 225. These are mere trivialities compared with Wiegand's record of more than 750 but impressive when compared with a total score of only 32. If these clear evidences of field-experience and intensive work on and understanding of the genus had been reversed, perhaps the results would be very different.—M. L. F.

THE VARIETIES OF LYCOPODIUM INUNDATUM.—The circum-boreal *Lycopodium inundatum* L., if it had stayed in the cool-temperate areas of Eurasia, would present no troublesome problem. In North America, however, it is one of a series of species and varieties which extend, as a somewhat perplexing group, all the way from Newfoundland to the Tropics. By many authors it has been considered to be confluent with the coarse *L. alopecuroides* L. of the southeastern United States and the West Indies, a species characterized by its low-arching or recurved-procumbent stem rooting at the tip, its leaves linear- or narrowly lance-attenuate and with the similar sporophylls usually bristly-ciliate, the upright densely leafy fertile branches 0.5–1.5 cm. thick, the strobile 1–2.5 cm. thick, the spores with coarsely reticulate base and with the apical half covered with coarse papillae crowded into rows. Thus Hooker in his *British Ferns* (1861) wrote, under *L. inundatum*, pl. 51: "*L. Carolinianum* and *L. alopecuroides*, and not a few others, supposed species, must be added to this list, if we were to make the exotic synonymy complete"; then, to add to the bibliographic confusion, he cited as a synonym "LYCOPODIUM *Bigelovii*. Oakes and Tuckerman in *Sillim. Journ.*". The latter unverified reference Hooker obviously borrowed from Spring, *Mon. Fam. Lycopod.* pt. ii. 33 (1849), who had cited as a synonym of *L. inundatum* L.: "*L. Bigelovii* Oakes et Tuckerm.! prius (ex Tuckerm. in *Sill. Journ. of Nat. Hist.*).". Oakes and Tuckerman made no such binomial! Instead, Tuckerman in *Am. Journ. Sci. and Arts* (conducted by Professor Silliman and Benjamin Silliman, Jr.), xlv. 47 (1843) had under *L. inundatum* two varieties: " β . *Bigelovii*, (mihi): majus, ramis subramosis elongatis, foliis acuminatis sparsim denticulatis s. integris. *L. Carolinianum*, Bigel. *Fl. Bost.* p. 384.— γ . *alopecuroides*, (mihi): . . . *L. alopecuroides* L.",